The Occupational Outlook

A Current Supplement to the Occupational Outlook Handbook

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NITED STATES DEPARTMENT OF LABOR
REAU OF LABOR STATISTICS
cooperation with
ETERANS ADMINISTRATION

The Occupational Outlook

UNITED STATES DEPARTMENT OF LABOR
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Bureau of Labor Statistics
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This publication is issued to provide counselors with current information on employment trends and outlook, based primarily on the continuous research and statistical programs of the Bureau of Labor Statistics. It supplements and brings up to date information in the Occupational Outlook Handbook, and supersedes the Occupational Outlook Review, formerly prepared for the Veterans Administration by the Bureau of Labor Statistics. It is prepared with the advice and assistance of the

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The Occupational Outlook

UNITED STATES DEPARTMENT OF LABOR • Bureau of Labor Statistics

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Prepared under the supervision of James J. Treires in the Division of Manpower and Employment Statistics, Seymour L. Wolfbein, Chief. Authors are staff members of the Division unless otherwise noted.

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THE COST OF ATTENDING COLLEGE

by Ernest V. Hollis*
U.S. Office of Education

How much does it cost an undergraduate student to attend college for the academic year?.

Where does he get the money for this purpose?

Answering these questions was the objective of a study recently completed by the Office of Education of the U. S. Department of Health, Education, and Welfare. The study was based on a survey of 15,316 students from 110 accredited colleges and universities located in 41 States and the District of Columbia. Only full-time undergraduates who were either single or not living with a spouse in 1952-53 were included in the survey.

Expenditures

The average total cost of attending college in 1952-53 was found to be about $1,530 per student. However, there was a great disparity in costs between public and private institutions. The average total cost of attending a public college in 1952-53 was only $1,300, while that of attending a private college was $1,850. It is estimated that by 1957 the average total cost of attending college had increased by about $200, to approximately $1,500 in public colleges and $2,000 in private ones.

These cost figures included educational expenses, such as tuition, fees, books, instructional supplies, and equipment; and living costs, such as room, board, clothes, travel, recreation and entertainment. At tax-supported colleges, educational costs represented one-sixth and living costs five-sixths of the total. The comparable figures for private colleges were one-third and two-thirds, respectively.

The average current expenditure of students for both educational and living purposes was $1,120 at public and $1,675 at private colleges in 1952-53. Current expenditures are less than total costs because they exclude money spent for such items as typewriters, slide rules, and scientific or musical instruments, as well as for cameras, hi-fi sets, and automobiles. These items have more than one year's use and were therefore classified as capital rather than current expenditures. More than half the students surveyed made capital expenditures during 1952-53. Such expenditures averaged $163 per student and increased mean current budgets 10 to 15 percent.

Factors Related to Expenditure Levels. In 1952-53, about a fifth of the students came from families having incomes under $3,000, and an additional two-fifths came from families with an income of less than $6,000. Current expenditures averaged $1,125 for men students in the lowest income group and were only about $100 more for those in the next income group. In both groups, the men spent about $200 more than the women.

Table 1. Mean current expenditures of students, by sex and family income group, 1952-53

Family income group	Percentage of total students		Current mean expenditures	
	Men	Women	Men	Women
Under $3,000	10	8	$1,125	$873
$3,000 - 5,999...	27	15	1,231	1,057
6,000 - 8,999...	12	7	1,369	1,288
9,000 - 14,999..	8	5	1,557	1,596
15,000 and up	5	3	1,917	2,207

Source: U. S. Office of Education.

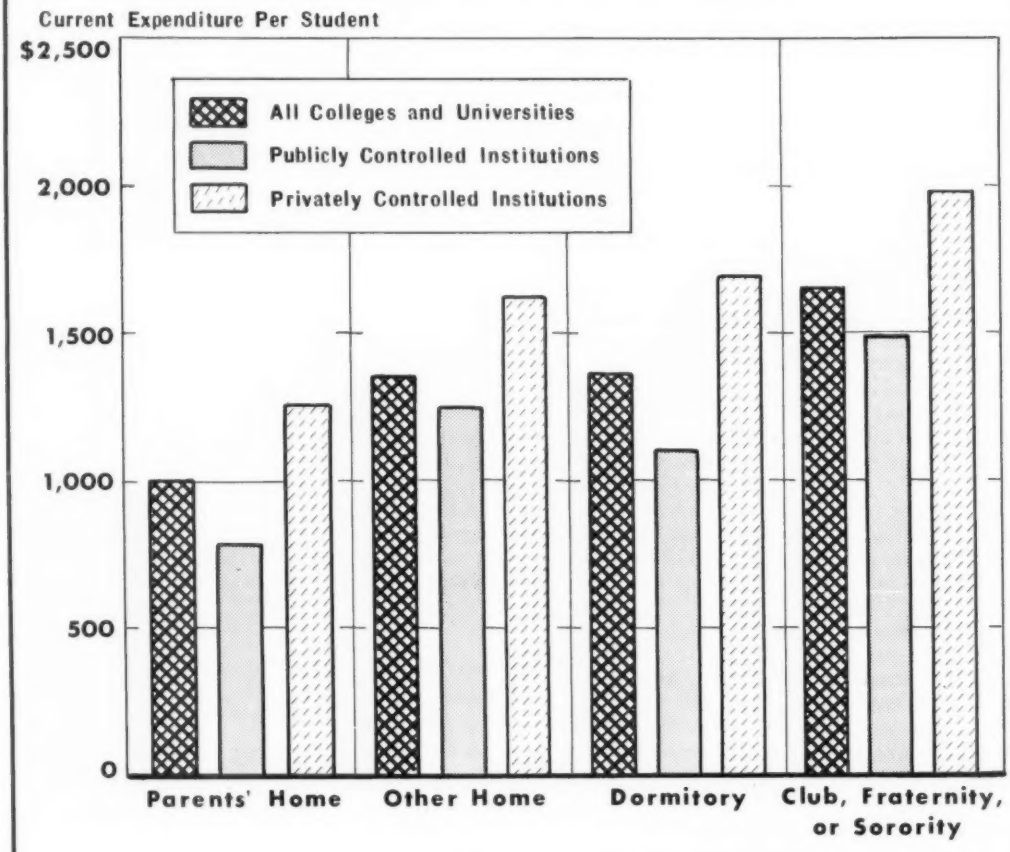
*Ernest V. Hollis is the Director of the College and University Administration Branch, Division of Higher Education.

Less than a tenth of the students came from families with incomes of $15,000 and over. Current expenditures of these students, compared with those in the lowest income group, were nearly twice as great for men and nearly three times as great for women. (See table 1.)

Where a student lives while at college is another important factor in determining the cost of attending college. For students living in their parents' homes, the average cost was about $1,000 in 1952-53. On the average, it cost the student about $350 more to live in some other private home or in a dormitory than with his parents, and another $300 to live in a club, fraternity, or sorority house.

Chart 1.

Total Current Costs in Public and Private Colleges, by Type of Student's Residence, 1952-53



Source: U.S. Department of Health, Education, and Welfare Office of Education.

Among students living in each type of residence, those attending private colleges spent considerably more than did those at public colleges (chart 1). Students living in their parents' homes while attending private college spent an average of $1,262--$473 more than the $789 spent by those attending public colleges. The greatest difference in rooming expenditures as between students attending public institutions and those attending private institutions was among dormitory dwellers ($584); the smallest difference was among students living in private homes other than their parents' homes ($378).

The average total costs for students in each of the 110 participating colleges ranged from $676 to $3,101. In other words, it cost nearly five times as much to attend the costliest institution as it did to attend the least expensive one. Among individual students, spending ranged from an "economy" budget of $200 to a "luxury" budget of $5,500 for the school year. The spending of the middle half of the students ranged between $815 and $1,708.

For students attending private institutions, expenditures tended to be highest at junior colleges and lowest at 4-year liberal arts colleges, with universities in between. For students enrolled in publicly supported colleges and universities, expenditures tended to be highest at technological institutions and lowest at junior colleges, with universities once more in the middle position.

Tuition. Tuition and related educational costs were the primary cause of the higher student budgets at private institutions, although living costs were also a little higher at private than public colleges. The average amount spent on tuition and fees at public colleges and universities in 1952-53 was about $225, while at private colleges it was $550.

Living Expenses. Student expenditures for regular meals was the largest single item in the cost of attending a public college and, except for tuition, it was also the largest expense item at private colleges. (See chart 2.) Students who ate in commercial places spent most for regular meals, followed by those eating in fraternities and college facilities. Of course, students living at home spent least for meals.

Students at private colleges also spent more for rooms. Room rent expenditures of students at private colleges averaged about $150 in 1952-53, while those of public college students averaged $100. Among both groups, room rents accounted for about 9 percent of total current expenditures.

Private college students spent an average of $150 for clothing; public college students spent only about $125. (These expenditures do not include items that may have been put on the family charge account.)

Spending for recreation accounted for about 9 percent of the budget of public institution students, and about 7 percent for private institution students; however, the actual amount spent on these items was less among public college students ($175) than private college students ($200).

Spending Patterns of Men and Women

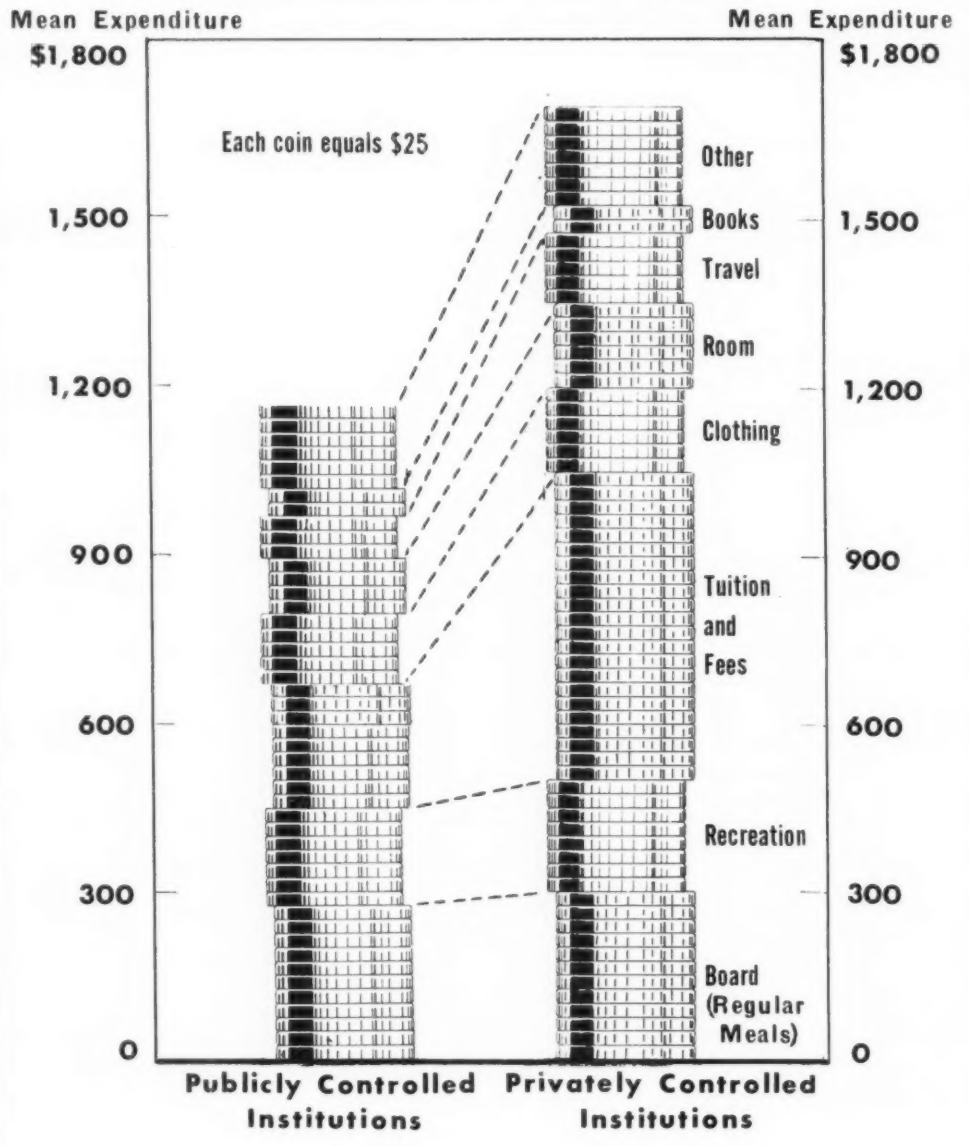
The survey revealed some interesting differences in the spending of men and women students. Among students from lower income families (less than $8,000), women spent less than men for tuition and fees and for room and board; but in the higher family-income groups (above $8,000) women spent more than men for these items. In each of the family-income groups, men spent more than women for recreation, and women spent more than men for clothing (chart 3.)

Sources of Student Income

The two major sources of student income were family aid (41 percent) and

Chart 2.

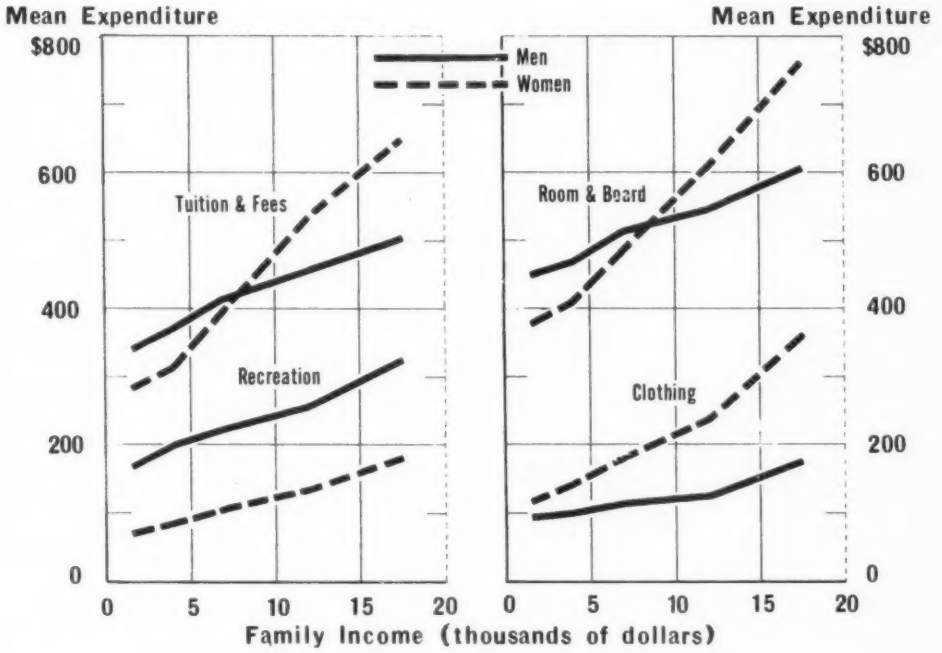
Amounts Spent by Students at Public and Private Colleges for Major Educational and Living Items, 1952-53



Source: U.S. Department of Health, Education, and Welfare
Office of Education

Chart 3.

Amounts Spent by College Men and Women on Four Major Items, by Family Income Group, 1952-53



Source: U. S. Department of Health, Education, and Welfare
Office of Education

students' own earnings (26 percent). Together these accounted for two-thirds of student income. Trust funds and other forms of long-term savings accounted for an additional 20 percent. Of the remaining 13 percent, 5 percent came from scholarships, 5 percent from veterans' and vocational rehabilitation programs, 1 percent from loans, and 2 percent from miscellaneous sources.

Family Income. The amount contributed to college students' budgets by their families from current income rose steadily with rising family income. The average contribution received by students was about $300 for those with family income under $1,500, and $650 for those with a family income of $5,000-$5,999. Students from families with an income of $9,000-$10,999 had received an average family contribution of over $1,000, and those from families with $25,000-and-over incomes had received an average contribution of over $2,000.

Long-term family savings were an additional source of income for a majority (63.7 percent) of the college students. These savings funds amounted to less than $1,000 for about three-fifths of the

students receiving such aid, between $1,000 and $2,999 for a fourth, and over $3,000 for the remaining 15 percent of the students who had any long-term savings.

Students also received financial help from relatives other than parents. In general, the less financially able the parents, the greater the assistance from other relatives. Relatives contributed toward college budgets of more than a fourth of the students from families with an annual income of less than $2,000 but to only about 8 percent of the students with families in the $9,000-and-over income bracket.

Student Earnings. Students, as a group, financed from their own earnings over one-fourth of their budgets during 1952-53. Most of this money came from earnings during the school year, and the rest came from summer earnings. More than a third of all students, and approximately 2 of every 5 men, who attended college in 1952-53 earned some money during vacations; the average amount of such earnings was $395 a year. A still larger proportion worked part time while attending college. Three-fifths of all students--two-thirds of the men and one-half of the women--earned money during the school year. Their average earnings were $486 and $265, respectively.

Scholarships. About 21 percent of the students received aid from scholarships. More than three-fourths of the scholarships awarded came from college-controlled funds. While the size of the awards reported ranged widely, most of them were rather modest; the median stipend from college-controlled funds was $218 as compared with $268 from funds administered by other organizations. Nearly half of all college-controlled annual stipends were under $200. More than two-thirds of the "under $200" scholarships were awarded to low family-income students, about 30 percent to students from the $5,000-$10,999 family-income group, and about 3 percent to those from the $11,000-and-up family-income bracket.

Private colleges awarded nearly twice as many scholarships in 1952-53 and the average stipend ($398) was nearly twice as large as that at public colleges ($195). However, because of the generally higher tuition at private colleges, scholarships awarded to public college students covered a higher proportion of the recipients' expenditures for tuition.

Other Sources of Income. Veterans' benefits and vocational rehabilitation ranked with scholarships as sources of total student income but fewer students received such aid--about 11 percent of the men and 1 percent of the women received income from these sources. Men and women also differed markedly in the extent to which they borrowed money to pay the costs of attending college. While loans from all sources amounted to only 1.5 percent of the total income of college students, the proportion of men who borrowed money for college expenses was nearly twice that of women.

The Economics of College Costs

While the quality of undergraduate education does not necessarily increase with its cost, no discerning student or his family should choose a college merely because it is inexpensive. The extra cost, if any, of attending the institution best suited to the student's needs can often be repaid from additional income earned during the first few years following graduation.

For most students and their families, the prospect of increased earning power is a powerful motivation for attending college. The costs of education should be regarded as a long-term investment and, therefore, should be appraised by the lifetime income that may be roughly attributed to education. According to a recent study made by two officials of the Bureau of the Census, U. S. Department of Commerce,[1] the average white male is estimated to re-

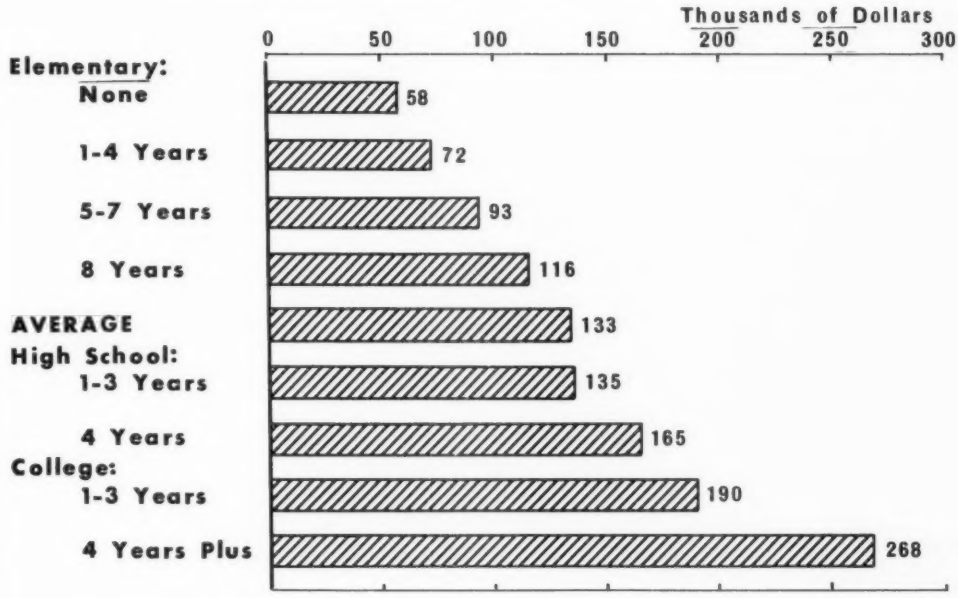
ceive income amounting to $133,000 during his economically productive years. The income is estimated to range from less than half of this amount for the man who is illiterate to more than twice that sum for the man who has completed 4 years or more of college and university study (chart 4). Furthermore, the man with a college degree or degrees is estimated to receive at least $100,000 more income in his working lifetime than a man whose formal education ends with high school graduation.

[1] Paul C. Glick and Herman P. Miller, Educational Level and Potential Income, in the American Sociological Review, Vol. 21, No. 3, June 1956.

In assessing the monetary value of a college education, the Census officials took into account what it costs the average individual to get a specified amount of schooling. The cost of college education (including a half-year of graduate study) was estimated at $9,000. This cost, with interest, was deducted from the increased income of college graduates. Assuming the $9,000 were invested in government bonds or some other safe investment producing about $24,000 in a lifetime--this would represent less than one-fourth of the $100,000 advantage that would be realized from investing the same sum in a college education.

Chart 4.

Estimated "Lifetime" Income (in 1949 Dollars) of Men With Different Amounts of Education



Source: Derived from Glick, Paul C., and Miller, Herman P, Educational Level and Potential Income. American Sociological Review, Vol. 21, No. 3, June 1956. (Based on 1950 Census data.)

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EMPLOYMENT OUTLOOK FOR TECHNICIANS*

by Bernard Michael

Technicians who work with engineers and scientists are among the fastest growing occupational groups in the United States. In recent years, the needs of the Nation's defense program, added to those of the expanding civilian economy, have greatly intensified the demand not only for engineers and scientists but also for technical workers with less training--technicians with whom this article is concerned. These technicians, whose jobs generally require a combination of basic scientific and mathematical knowledge and manual skill, participate in research and development work, and in designing, producing, and maintaining the machines and materials of our increasingly complex technology.

Nature of Work

The term "technician" is used to describe a large group of occupations at many levels of skill and with a wide variety of training requirements. In general, technician jobs fall between those of the skilled craftsmen and the professional engineer or scientist. The work is technical in nature but narrower in scope than that of the engineer or scientist, and has a practical rather than a theoretical orientation. Frequently, technician jobs require use of complex electronic and mechanical instruments, experimental laboratory apparatus, drafting instruments, tools, and machinery. Almost all technicians must be able to use engineering handbooks and computing devices such as slide rules or calculating machines.

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Electronic technician services an ionospheric sounder

Technicians are utilized in virtually every activity where technical know-how is required. One of the largest and best known types of employment for them is research, development, and design work. Technicians in this type of activity are identified by a variety of titles--such as laboratory technician, physical science aid, or engineering aid--and generally serve as direct supporting personnel to engineers or scientists. They conduct

*This article, which relates to all technicians who work with physical scientists and engineers, supplements the information on draftsmen and electronic technicians contained in the 1957 edition of the Occupational Outlook Handbook. The article is based on a study prepared by the Department of Labor's Bureau of Labor Statistics for the Veterans Administration. The full report, Employment Outlook for Technicians--A Report on Technicians Who Work with Engineers and Physical Scientists, will be published as a pamphlet in the near future.

laboratory experiments or tests, set up, calibrate, and operate instruments, and make calculations. They may work on the fabrication and assembly of experimental equipment and developmental models and do drafting, and, in some instances designing.

Technicians in jobs related to production usually follow a course laid out by the engineer or scientist, but they often work without close supervision. They may aid in the various phases of production planning, such as working out specifications regarding needed materials and methods of manufacture. Sometimes technicians serve as production supervisors or inspectors, perform tests to insure quality control of products, or make time and motion studies to improve the efficiency of operations. They may also provide liaison between departments, such as research or engineering and production.

In the installation, operation, and maintenance of complex machinery and equipment, technicians often perform or supervise work that might otherwise have to be done by engineers. They frequently are responsible for trouble-shooting and repair work requiring considerable theoretical as well as practical knowledge.

Technicians may also be employed as supervisors of construction projects, as manufacturers' technical representatives who aid the customer in achieving maximum utilization of technical equipment, as salesmen of technical products, or as technical writers of specifications and manuals. In many of these activities also, they perform duties which might otherwise have to be handled by engineers or scientists.

The nature of the work performed by technicians varies tremendously among industries and among plants in the same industry. Even within a single plant some technicians may perform relatively simple routine tasks while others do work of a highly technical nature, which sometimes overlaps the functions of the engineer.

There is also no uniformity in job titles of technicians. Trained technicians doing similar work may be given general titles, such as engineering aid, junior engineer, physical science aid, or laboratory assistant, or specific titles such as time study analyst or tool designer. Many groups concerned with the training of these personnel advocate use of the terms "engineering technician" or "scientific technician."

Where Employed

Private Industry. Technicians are employed in a wide range of manufacturing and nonmanufacturing industries. The branches of manufacturing employing large numbers of technicians include aircraft, chemical and allied products, electrical equipment, fabricated metal products and ordnance, petroleum, and professional and scientific instruments. Nonmanufacturing industries which are also large employers of technicians include construction, telecommunica-

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Laboratory assistant checks the temperature on a distillation setup

tions and broadcasting, and transportation and other public utilities.

In general, large companies employing many scientists and engineers are the greatest source of employment for technicians. However, many smaller companies also employ technicians when the technology of the industry makes it advantageous to use them.

Research and development work is one of the major fields of employment for technicians. In January 1954, approximately 90,000 technicians were engaged in research and development work in firms employing 1,000 or more employees (table 1). More than half of these technicians were in the aircraft and parts, electrical equipment, chemical and allied products, and machinery industries. About 82 percent of them were in very large companies--those employing 5,000 or more workers. Relatively few technicians were employed in research and development in companies with less than 1,000 employees according to the fragmentary data available for such companies.

Technicians are employed in all States and in small as well as large cities. However, the greatest numbers are concentrated in or near major metropolitan areas in the highly industrialized States of New York, California, Pennsylvania, Ohio, Illinois, Michigan, New Jersey, Texas, and Massachusetts.

Federal Government. The Federal Government is an important employer of technicians in times of peace as well as during emergency periods. Most Government technicians of the types covered in this report are in the following seven occupational categories: Engineering aid, engineering draftsman, cartographic aid, cartographic drafts-

TABLE 1. Estimated number of technicians in research and development activities, by size of company and industry, January 1954

(Companies with 1,000 or more employees)

Industry	Total	Companies having total employment of	
		1,000 - 4,999	5,000 and over
Total[1]	88,900	14,900	73,900
Food and kindred products	1,400	300	1,100
Chemical and allied products	8,400	1,900	6,500
Petroleum products and extraction	3,400	500	3,000
Rubber products	1,600	200	1,400
Primary metal industry	1,700	400	1,300
Fabricated metal products and ordnance	1,700	1,200	500
Machinery	6,800	3,200	3,600
Electrical equipment	18,500	2,800	15,700
Aircraft and parts	17,200	1,300	15,900
Professional and scientific instruments	3,800	600	3,300
Other manufacturing industries	20,600	2,100	18,500
Nonmanufacturing industries	3,800	700	3,100

[1] Since figures are rounded to nearest 100, items do not add to totals in all instances.

Source: U. S. Department of Labor, Bureau of Labor Statistics, Science and Engineering in American Industry, 1953-1954, (published by the National Science Foundation); and unpublished data from the survey on which the report was based.

man, physical science aid, electronic technician, and mathematics aid.

As of February 28, 1957, the Federal Government had 31,098 employees in the selected technician occupations. (See table 2.) About 19,000, or slightly more than 60 percent, of these technicians were working in the Department of Defense--in the Army, Navy, and Air Force. The Departments of Interior, Commerce, and Agriculture employed 10,700, or about 34 percent, and the remaining technicians were scattered throughout a number of other Government agencies.

Employment in each of the seven technician occupations also tended to be concentrated in a relatively few Government agencies. For example, about 94 percent of the 5,858 electronic technicians were employed in the Department of Defense in the Army, Navy, and Air Force, and in the Department of Commerce, where large numbers are needed by the National Bureau of Standards and the Civil Aeronautical Administration. Almost 40 percent of the 3,493 persons working as cartographic aids were employed by the Department of the Army; other agencies which employed large numbers of these technicians included the Departments of Interior, Commerce, and Air Force. The Army and Interior Departments employed about 70 percent of the cartographic draftsmen. The Navy and National Advisory Committee for Aeronautics employed about three-fourths of the 571 mathematics aids.

How To Become a Technician

Young men and women who wish to prepare for careers as technicians can obtain formal education for this work from a number of sources, including technical institutes, junior and community colleges, extension divisions of universities, and colleges offering 2-year technical programs. Training for technician jobs can also be obtained through programs operated by companies for their employees, and from correspondence schools, vocational schools, and a few advanced technical high schools. Not all persons who work as technicians have had specific training for this work. Engineering or liberal art students who have not completed all requirements for a degree, some graduates of liberal arts colleges, and other persons with some post-high-school education in mathematics and science are often employed in technical positions. Many workers become technicians through only on-the-job training and experience.

TABLE 2. Percent distribution by grade of Federal Government white-collar employees in selected technician occupations, February 28, 1957

Occupational group	All grades		Percent distribution by grade									
	Number	Percent	1	2	3	4	5	6	7	8	9	10-14
Total	31,098	100.0	.7	6.9	10.0	11.7	16.5	14.4	20.2	3.5	10.8	5.3
Engineering aid	10,857	100.0	.9	11.5	14.9	16.4	19.2	13.8	18.6	1.7	2.6	.4
Engineering draftsman	6,879	100.0	.6	5.8	8.2	9.5	17.4	19.5	24.2	2.3	9.4	3.1
Electronic technician	5,858	100.0	(1)	.1	.4	1.0	2.7	6.0	23.3	10.9	34.5	21.1
Cartographic aid	3,492	100.0	.8	2.9	10.3	12.2	19.2	19.4	19.7	2.2	9.1	4.2
Physical-science aid	2,278	100.0	.7	5.9	12.6	17.5	27.8	14.4	15.0	1.9	3.5	.7
Cartographic draftsman	1,163	100.0	2.6	14.5	3.4	15.6	19.1	17.7	15.3	.3	1.2	.3
Mathematics aid	571	100.0	.2	15.9	18.7	21.9	25.2	11.9	5.6	.4	---	.2

[1] Less than .05 percent. Source: Compiled from data furnished by U. S. Civil Service Commission, Employment Statistics Office.

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Student technicians adjust radar equipment

The entrance requirements of schools specializing in education for technician jobs are usually less rigid and standardized than those of 4-year colleges. All institutions offering post-high-school technical training organize their courses for high school graduates. However, some admit students without a high school diploma if they have completed the equivalent of a full high school course, or if they satisfy age requirements and can pass special examinations or otherwise demonstrate their ability to do work above the high school level. For all the occupations considered in this report, basic training in mathematics and science is essential, and students who expect to prepare for the technician field should, therefore, obtain a good background in these subjects in high school.

Because of the variety of educational institutions from which training may by obtained, and differences in the kind and level of training offered, a person seeking a technical education should use more than ordinary care in selecting a school. If possible, information should be secured about State accreditation, professional recognition, the length of time the school has been in operation, laboratory facilities, faculty qualifications, transferability of credits, and the success of the school's graduates. Students should also inquire about the costs of technical education, and available scholarships and other financial aids.

A brief discussion of some of the types of educational institutions and other sources from which young people can obtain training as technicians follows.

Technical Institutes. These schools offer 1, 2, or 3 years of training above the high school level. Two years is the usual training period.

The programs of technical institutes are usually designed to give the prospective technician an engineering and science background which prepares him for some specific job or cluster of related jobs. The scope of these programs is more limited than that required to prepare a person for a career as a professional engineer. Much emphasis is placed on laboratory and drafting work in order to familiarize students with instruments, equipment, and techniques used in industry.

Some schools offer cooperative programs under which a student spends part of his time in school and part in employment related to the occupation for which he is preparing himself. It may take more than 2 years to complete the course at a technical institute with a cooperative program but this type of program gives students valuable experience in industrial situations, which often outweighs the disadvantages of a longer training period. In addition, students participating in cooperative programs earn enough to pay for at

least a part of their educational expenses.

Most technical institutes conduct both day and evening sessions. Evening classes are of particular importance to students who, for financial reasons, must have full-time jobs. By attending such classes, employed workers can often upgrade themselves to higher level technician jobs or obtain sufficient training to shift to a technician's job from another field of work. More than half of all the students attending technical institutes in 1956 were part-time students in evening and special classes.

Some technical institutes give associate degrees which signify that the student has completed at least 2 years of college-level work. However, if the prospective student desires eventually to obtain a bachelor's degree from a 4-year college, he should investigate in advance whether his technical institute credits are transferable to the college of his choice.

Some technical institutes are operated as extension divisions of colleges and universities. Others include separate institutions operated by States or municipalities, privately endowed institutions, proprietary schools, and YMCA schools. Altogether, there were about 71 technical institutes with a total of more than 67,163 full- and part-time students in 1955-56.[1]

Junior Colleges. Some of the approximately 625 junior or "community" colleges in the country also prepare students for technician occupations in industry and government.[2] These schools usually offer 2 years of post-high-school education. It is common practice to award the degree of associate in arts upon completion of the 2-year program. In contrast with most technical institutes which concentrate upon terminal education, (after which the student is not ordinarily expected to take advanced work elsewhere), junior colleges also offer courses equivalent to those given in the freshman and sophmore years of 4-year colleges so that students completing this type of curriculum can, if they are properly prepared, begin with the junior year in a 4-year college.

Many junior colleges are important adult education centers and offer extensive part-time courses at night. Through appropriate courses at junior colleges, as at technical institutes, workers may prepare themselves for higher grade jobs. Adults and special students accounted for more than half the total enrollment in junior colleges in 1955-56.[3]

Training in Industry. Some large corporations conduct training programs for technicians. This type of training is primarily technical and rarely includes any general studies. Instruction is given both through formal classes and through training on the job. Workers who receive their training entirely on the job do not usually get as much theory as those who receive formal instruction.

Other employers who do not have training programs but are aware of the need for technically trained workers often encourage their employees to attend classes in local schools or to enroll in correspondence courses. Employers sometimes ask the schools to arrange special educational programs which will expand the technical background of their employees. Some large corporations reimburse their employees for tuition after they have completed the course satisfactorily. The workers are usually expected to take courses directly related to their work assign-

[1] Leo F. Smith, Annual Survey of Technical Institutes, 1955-56; Technical Education News, Vol. XV, No. 4, September 1956.

[2] Information on junior colleges offering technician training is available from the American Association of Junior Colleges, 1785 Massachussetts Ave., N. W., Washington 6, D. C.

[3] American Association of Junior Colleges, Junior College Directory, 1957.

ment, and are often allowed to attend classes on the employer's time.

Training for some occupations in the technician category may be obtained through a formal apprenticeship lasting 2 or more years. Occupations of which this is true include those of tool and die designer and draftsman. Supplementary education in mathematics and science is almost always necessary. Persons interested in apprentice training can obtain further information from the local office of their State Employment Service, directly from employers, or from the local labor union concerned with the occupation they wish to learn. High school graduates are usually given preference for openings.

Other Training. Although most of the jobs considered in this report require post-high-school education or the equivalent in experience, a few advanced technical high schools offer programs which qualify their graduates for entry jobs as technicians. These high schools have high admission requirements and offer more thorough and advanced courses in mathematics, science, drafting, and laboratory work than either an academic high school or a vocational school.

Correspondence schools and home study courses constitute additional sources of preparation for technicians. Persons who wish to learn more about their jobs or who wish to advance to a better job in the same field are the ones who derive the most benefit from such courses.

In addition to the sources of training already discussed, many thousands of technicians are trained each year by the Armed Forces. Each military establishment--the Army, Navy, Air Force, Marine Corps--trains its own specialists. Some trainees are given intensive short courses, others receive extensive training of a year or more. Much of the training is transferable from military to civilian jobs.

Employment Outlook

The outlook is for continued expansion in employment of technicians in the years ahead. Technicians have been in recent decades one of the fastest growing occupational groups, and there is every indication of continued rapid growth in these occupations. Some of the major factors expected to raise the demand for technicians are continued growth of population and expansion of industry, and the increasing complexity of modern technology. The trend toward automation of industrial processes, the Nation's vast highway building program, and the growth of new areas of work, such as the atomic energy field, are expected to add to the demand for technical personnel. Depending on the form they take, changing national defense policies may also affect the employment of technicians.

Also of great importance to the long-run growth in the employment of technicians is the prospect of a continued high level of expenditures for research and development in future years. More and more companies are establishing research programs and strengthening existing programs to meet the strong competition in developing new products and processes. Furthermore, expenditures for defense-related research, which have loomed so important in recent years, are expected to continue at a high level. It is anticipated that technicians will be needed in large numbers in research, development, design, and other preproduction functions. As products and the methods by which they are manufactured become more complex, increasing numbers of technicians are also expected to be required in production, maintenance, technical sales, and servicing jobs.

Altogether, many new positions for technicians will be created by growth in the field. In addition, many employment opportunities will arise each year because of deaths, retirements, or transfer of experienced technicians to other fields of work.

The number of job openings available to technicians in any one year will, however, reflect the general economic situation and changes that may occur in the Nation's defense program. A substantial increase in research and development, missile production or other aspects of the defense program, or an acceleration in other government programs such as public works would intensify the demand for technical personnel. On the other hand, if the defense program should be cut substantially, or the level of business activity should fall sharply, the demand for technicians would be reduced, and many would face competition for jobs from persons with other backgrounds, particularly professional workers.

Employment opportunities for well-trained women technicians have been good in recent years. In the past, women technicians have been employed chiefly in drafting jobs, in chemical and other laboratory work, and in computation and other work requiring application of mathematics. Over the long run it is likely that more women will be trained and find employment in these and other technician occupations.

In general, a technician's earnings depend upon his education, his technical specialty, and his work experience. Other important factors which influence his earnings are the type of employer for whom he works, the kind of work he does, and the geographic location of his job.

Private Industry. Information on the earnings of some types of technicians in private employment is available from a number of surveys in different industries and localities, though no nationwide studies have been made of technicians' pay. It should be noted that most of this information is based on surveys conducted in early 1957 or before; by the end of 1957, the indications were that earnings in many technician occupations were higher than those given in the following paragraphs.

Draftsmen. The job of tracer is the usual entrance position in the draftsman category for persons with little or no training or experience. In 11 cities covered by Bureau of Labor Statistics surveys in late 1956 and early 1957, tracers had average straight-time weekly earnings ranging from $55.50 in Dallas to $79.50 in Pittsburgh. Junior draftsmen, the group at next higher level of skill, usually earn considerably more than tracers in the same city. For example, average straight-time weekly pay of junior draftsmen was $70 in the Dallas area and $82.50 in Pittsburgh. Still higher earnings were received by senior draftsmen and chief draftsmen, whose pay ranged from $88.50 to $115 and from $109.50 to $149, respectively, in the 11 cities.

Electronic Technicians. Earnings of electronic technicians employed in the manufacture of military and commercial electronic equipment ranged from about $1.75 to $3 an hour in 1956. Electronic technicians employed in aircraft manufacturing plants were among the better paid groups of electronic technicians. In 1956, most of these workers earned from $2 to $3 an hour. Those employed in radio and television manufacturing plants were paid hourly rates ranging from about $1.75 to $2.50 in mid-1956. Generally, electronic technicians in research and development work receive higher pay than those employed in other activities.

The earnings of electronic technicians working in radio and television broadcasting stations vary greatly with the size of the station and of the community. Beginning salaries for these technicians ranged from about $50 to $80 a week in mid-1956. Weekly earnings of experienced men ranged from about $80 to more than $150. Some technicians in the network originating stations earned more than $165 a week.

Aeronautical Technicians. A recent study made by the Institute of the Aeronautical Sciences shows the salary ranges and the minimum education and

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experience needed for a young man to qualify for various positions in the aircraft manufacturing industry in January 1957. Data on several technician positions in this industry are given below:

Occupation	Education requirements (above high school)[4]	Minimum experience (years)	Monthly salary
Draftsman	2 years' engineering	0-3	$280-485
Drawing checker	2 years' engineering	0-5	370-750
Mathematician	2 years' mathematics	0-3	300-700
Production engineering liaison man	2 years' engineering	3-5	350-750
Technical writer	2 years' engineering	0-4	325-625
Standards analyst	2 years' college	0-3	325-550
Tool designer	2 years' engineering	2-8	375-700
Weight analyst (calculates and estimates weight, balance, etc. for parts and assemblies)	2 years' engineering	0-4	325-450

Technical Institute and Junior College Graduates. Further information on technicians' pay is available from studies of the 1957 earnings records of graduates of several technical institutes. For example, the Business and Technology division of Long Beach City College, Long Beach, Calif., reported starting salaries of $325 to $500 a month for its technician graduates. The Academy of Aeronautics, La Guardia Airport, N. Y., reported that its graduates were entering the aviation industry at salaries ranging from $400 to $500 a month. The Franklin Technical Institute and Wentworth Institute, both in Boston, Mass., reported that their graduates in the various technical occupations were starting at $85 to $95 a week.

Federal Government. The Federal Government classifies technician jobs, as it does other positions, in grades based on the qualifications required and the difficulty and responsibility of the work. In general, technicians with 2 years of appropriate post-high-school training or experience can begin in jobs classified in grades 3 or 4 and may progress through grade 9. Some attain even higher grades (table 2).

The annual salary rates for grades 3 through 9, in effect since March 1955, follow:

Grade	Salary range
GS-3	$3,175 to 3,685
GS-4	3,415 to 3,925
GS-5	3,670 to 4,480
GS-6	4,080 to 4,890
GS-7	4,525 to 5,335
GS-9	5,440 to 6,250

Almost 90 percent of all Federal workers in the 7 selected occupations in February 1957 were classified in grades 3 through 9 (table 2). The largest percentage of the engineering and physical science aids were in grade 5 as of February 1957 and were earning between $3,670 and $4,480, inclusive, a year, depending mainly on length of service. Almost 25 percent of the engineering draftsmen were classified in grade 7, where annual salaries ranged from $4,525 to $5,335. Employees in the electronic technician group had the highest grade level: About 60 percent were in grades 7 and 9, and more than 20 percent were in higher grades (10 to 14).

[4] Comparable training may be substituted for educational requirements.

PROTECTING YOUTH FROM WORK HAZARDS

by Miriam Fuhrman
Bureau of Labor Standards

Counselors and others who guide young people in choosing an occupation should be familiar with both State and Federal laws which restrict the employment of persons under 18 years of age. A better understanding of why and how these regulations came into being can help in interpreting them to young counselees. This article discusses regulations affecting the employment of youth in hazardous occupations.

Machines and processes in modern industry are so numerous, so diverse, and so complicated that a formal set of procedures had to be developed to carry out the protective intent of the Fair Labor Standards Act of 1938. Under the Act, the Secretary of Labor is empowered to issue Hazardous Occupations Orders which make it unlawful to employ persons under 18 for certain jobs that are particularly hazardous for them. The U. S. Department of Labor's Bureau of Labor Standards, which has the responsibility for investigating hazards and recommending Hazardous Occupations Orders under the Fair Labor Standards Act, is guided in its work by a number of principles. First, the Bureau recognizes that occupations particularly hazardous or detrimental to the health or well-being of workers in general are also hazardous or detrimental to the health or well-being of minors under 18. Second, other occupations not particularly hazardous or detrimental to the health or well-being of adult and experienced workers may be particularly hazardous for minors under 18 or be detrimental to their health or well-being. Among these occupations are those requiring a higher degree of muscular coordination, stability, maturity of judgment, or resourcefulness in meeting emergencies than is usually characteristic of young workers, and those occupations which are inhibitory or injurious to growth or development. Third, the Bureau believes that prohibitions on employment of minors in hazardous occupations should not have the effect of unduly restricting general employment.

Occupations to be investigated for hazards are selected from industries covered by the child-labor provisions of the Fair Labor Standards Act of 1938 on the basis of (1) suggestions and recommendations of well-informed people such as safety engineers, (2) the numbers of young people employed in a particular occupation, and (3) the known hazards as shown by statistical data. During the investigation, trained personnel gather statistical data on industrial injuries, visit typical plants to observe the occupations and their hazards under actual operating conditions, and seek the opinion and advice of safety engineers, plant supervisors, trade association officials, union leaders, and State factory inspectors, as well as experts from industrial accident commissions and agencies of the Federal Government. The aim is to keep youngsters out of those jobs that are particularly hazardous to them without barring them from any more jobs than necessary.

A report is prepared on the basis of the investigation, and together with a draft of a proposed finding and order, it is submitted for criticism and suggestions to a technical advisory committee appointed from the ranks of employers, workers, and experts in the particular field under consideration. After the proposed finding and order is issued and published, opportunity is given for any interested party to make objections to or suggest revisions in the order at a public hearing. Objections and suggested revisions are

carefully considered, and if they are found to be justified, the proposed order is revised. Thereafter, the order is adopted and issued by the Secretary of Labor. Once issued, the orders have the force of law, and a violation of their provisions constitutes a violation of the child-labor provisions of the Fair Labor Standards Act.

Thirteen Hazardous Occupations Orders have been issued to date. Some of these orders set an 18-year minimum age for operating certain machines or equipment only, while permitting minors of 16 and 17 to work in other occupations in the industry or even in the same workroom. In other cases, the workplace itself may be so hazardous or detrimental that youngsters under 18 are kept out altogether. For example, all coal mining occupations except a few surface jobs are closed to minors under 18, whereas only a very few bakery machines require an 18-year minimum age.

The U. S. Department of Labor's Wage and Hour and Public Contracts Divisions is responsible for enforcing these orders, as well as other provisions of the Fair Labor Standards Act. The Division's regional and field offices can advise counselors whether a specific work assignment or occupation is closed to minors under 18. Employment certificating officers can also supply information about the application of these orders to specific jobs. These work permits, usually issued by local school officials, serve as proof of age for purposes of enforcement of the Federal law. The U. S. Department of Labor works closely with the issuing officers to keep them informed about the requirements of the Fair Labor Standards Act. Detailed provisions of the orders, as well as information on the other child-labor provisions of Federal law, are given in Wage and Hour and Public Contracts Division Child Labor Bulletin No. 101.[1]

[1] This bulletin may be obtained from any of the regional or field offices of the Wage and Hour and Public Contracts Divisions of the U. S. Department of Labor.

Youngsters are easily diverted.

The orders, by numbers, and the occupations with which they are concerned are:

1. Occupations in or about plants manufacturing or storing explosives or articles containing explosive components.

2. Motor-vehicle driver and helper.

3. Coal-mine occupations.

4. Logging occupations and occupations in the operation of any sawmill, lath mill, shingle mill, or cooperage-stock mill.

5. Occupations involved in the operation of power-driven woodworking machines.

6. Occupations involving exposure to radioactive substances and to ionizing radiations.

7. Occupations involved in the operation of power-driven hoisting apparatus.

8. Occupations involved in the operation of power-driven metal forming, punching, and shearing machines.

9. Occupations in connection with mining, other than coal.

10. Occupations in or about slaughtering and meat packing establishments and rendering plants.

11. Occupations involved in the operation of bakery machines.

12. Occupations involved in the operation of paper-products machines.

13. Occupations involved in the manufacturing of brick, tile, and kindred products.

As conditions in the industry or occupation change or as experience indicates a need, these orders are reviewed and amended in accordance with new knowledge. For example, Order No. 6, originally issued in 1942 to cover occupations involving exposure to radioactive substances, was amended in 1949 and again in 1957 to take into account new developments in the use of nuclear materials in industry.

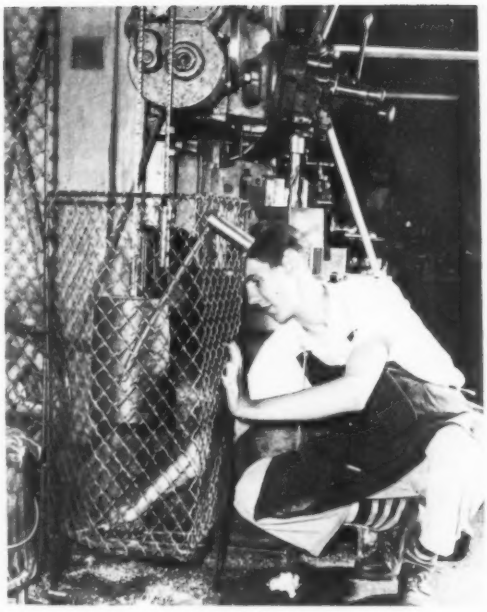
Being a helper is often more dangerous than driving.

In addition to the Federal regulations, many States also have set a higher minimum age for certain hazardous occupations than is set for general employment in their child-labor laws. Counselors may wish to find out from their State labor departments which occupations are classified as hazardous under their State laws.

Not all jobs that are in fact hazardous are covered by Hazardous Occupations Orders. For jobs which require a degree of skill that rules out employment of youngsters under 18, no order would seem to be required. Some hazardous jobs are not covered by Federal orders because the Federal law does not apply to the industry in question. Many accidents occur in bowling alleys, for example, but the Federal law does not apply to such purely local enterprises. Agriculture is one of the most hazardous industries, because of the mechanical equipment now used on farms. Even casual readers of the newspapers have probably noticed the frequent accounts of children killed or injured as a result of accidents with tractors and other farm machinery. But because the Federal child-labor regulations apply to employment in agriculture only during school hours, a Hazardous Occupation Order in agriculture would be of limited usefulness.

Sometimes observers feel that there is an inconsistency in the Hazardous Occupations Orders because a minor must be 18 in order to operate some machines, whereas other machines that look the same may be operated by minors 16 or 17. Not all machines that look alike are equally hazardous, however. They may be operated at different speeds, they may be used on different materials, or they may be part of a production process that involves a different degree of hazard all along the line. Investigations are necessary to enable orders to be issued with a desirable degree of discrimination.

Some observers may think that adequate guards make machines safe



If the machine is dangerous, guards do not always protect.

for anyone, young or old, to operate. Safety men know that no machine can be made completely safe by protective guards. Guards are effective when the operator recognizes their value and sees to it that they are in the proper position. But if the operator works on an incentive system and feels that the guards slow him down, or if he fails to realize the damage the machine can do, guards may be removed or set aside. Most youngsters have not been around these machines long enough to recognize the risks. Besides, many young people think it is "chicken" to play safe. So guards are set aside and goggles pushed on top of the head or discarded.

Many more students are working now than ever before. Census figures show that only 4 percent of the school-enrolled young people age 14-17 had jobs in 1940, whereas, in 1956, 22 percent of the students in that age group worked while attending school. Thus, even the less serious job accidents and

injuries can result in lost time and interference with schooling.

Fatal job accidents occur all too frequently despite precautions and efforts to make all workers safety-conscious. Accident reports received by the Bureau tell of permanent injuries, such as the loss of fingers, limbs, or eyesight, received by boys and girls on hazardous jobs. Injuries, even when nonfatal, sometimes mean that vocational plans for a youngster have to be scrapped and his future replanned. One girl who was working during vacation to finance advanced study of the piano, lost three fingers of her right hand in the machine she was tending.

Whether he is a student working part time or a youth on a full-time job, the young worker should be protected from those jobs which might interrupt his schooling or cause him to be handicapped for the rest of his life. The Hazardous Occupations Orders are one way of affording this protection to young workers.

STARTING SALARIES OF CHEMISTS AND CHEMICAL ENGINEERS IN 1957

Starting salaries of inexperienced chemists and chemical engineers increased by more than 8 percent in 1957--the largest annual gain reported by the American Chemical Society since 1952 when the Society began its series of annual salary surveys. Chemical engineers with doctorates received a median monthly starting salary of $675, and Ph. D. chemists, $650. Corresponding figures at the master's degree level were $525 and $485 and, at the bachelor's degree level, $460 and $435, respectively.

Starting salaries for those with experience (25 or more weeks) were generally about $15 to $25 per month higher than for those without experience. However, experienced chemists who received their master's degree in 1957 received monthly starting salaries about $50 higher than inexperienced persons with the same training.

Most of the chemists and chemical engineers surveyed had gained experience during summer vacations. Their pay in 1957 was, of course, somewhat lower than that paid to those who started permanent positions at the same time.

More detailed information on the findings of the 1957 survey conducted by the American Chemical Society is available from the article Starting Salaries Marked Up 8 Percent, by B. R. Stanerson, published in Chemical and Engineering News, Vol. 35, October 28, 1957, page 76. Reprints of this article may be obtained upon request to the American Chemical Society, Washington, D. C.

BEGINNING TEACHERS IN 1956-57

by Ward S. Mason, Robert J. Dressel, and Robert K. Bain

U.S. Office of Education

Much has been said and written about the shortage of classroom teachers in the past few years. It is well known that the increased birthrate after the war resulted in rapidly expanding enrollments in the Nation's schools. Yet between 1950 and 1955, the number of people graduating from college was going down.[1] Faced with this situation, the Nation has become increasingly concerned about the problem of attracting and retaining qualified teachers. Although teaching is attracting an increasing proportion of young people, we hear and read a great deal about discontent among teachers--that they are underpaid, that many are quitting and taking other jobs, and so on.

Objective information on these and related questions of special interest to young people pondering the choice of a teaching career is available from a recent study conducted by the U. S. Office of Education. In an effort to obtain a better picture of the situation faced by persons entering the teaching profession, the U. S. Office of Education conducted a nationwide survey of beginning (i.e., inexperienced) public school teachers in the spring of 1957. The survey contained a fairly large number of questions concerned with such matters as personal characteristics, educational preparation, economic status, and commitment to teaching as a career. Questionnaires were mailed to a probability sample of 10 percent of the beginning teachers in the country. The full analysis of the data collected has not yet been completed. However, it is possible to present some preliminary findings for a few selected items based on the information supplied by the first 4,065 teachers replying. These results, although believed to be representative, are of course subject to some revision when the total sample of over 7,000 is analyzed.

Personal Characteristics

The results of the survey may be better understood if one has some knowledge of the type of people who reported. Of the teachers who began their careers during the 1956-57 school year, 37 percent were men and 63 percent were women. A majority (59 percent) of the secondary teachers were men, while a large majority (79 percent) of the elementary teachers were women.[2] Putting it another way, over two-thirds (68 percent) of all the men taught in secondary schools, while an even higher proportion of the women (71 percent) taught in elementary schools. At both elementary and secondary levels there was a higher proportion of men in the smaller school districts (as measured by pupil enrollment) than in the large districts. (See chart 1.)

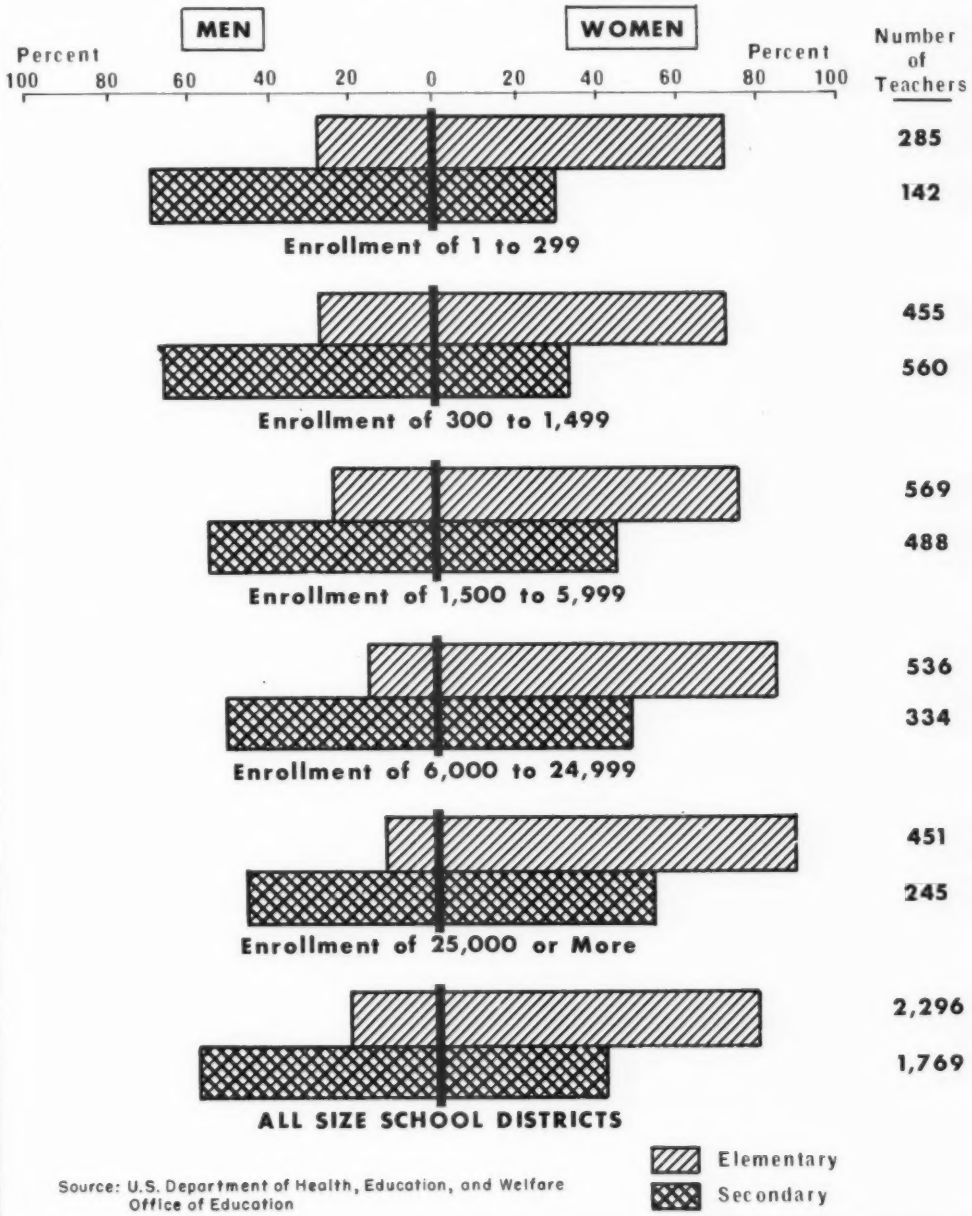
Comparisons between men and women teachers show that 65 percent of the men were married, as compared

[1] For a recent review of the supply and demand of teachers, see The Postwar Struggle to Provide Competent Teachers (in The National Education Association Research Bulletin, Washington, D. C., October 1957).

[2] For the purpose of this report an elementary teacher may be defined as a teacher in any grade from kindergarten to 6th and, where separate junior high schools are not maintained, grades 7 and 8 also. A secondary teacher is one who teaches in a junior high school or one of the various other types of high school.

Chart 1.

Distribution of Beginning Teachers, by Sex, Teaching Level, and Enrollment of School District, Spring 1957



Source: U.S. Department of Health, Education, and Welfare
Office of Education

with 44 percent of the women. The median age of the men was 25.5 years and of the women, 22.8 years.

Preparation

Type of Institution Attended. Beginning teachers obtain their undergraduate education from a variety of types of institutions. The proportion of the responding teachers (including those who never obtained a bachelor's degree) who did their undergraduate work at each type of institution was as follows:

Four-year teachers college	35 percent
Liberal arts college	25 percent
Teachers education unit of a university	24 percent
Other unit of a university	10 percent
Junior college	3 percent
Other types of institutions or no reply	3 percent

Certification. One beginning teacher out of five was teaching with an emergency (or substandard) certificate in 1957. Furthermore, 13 percent of those with standard certificates stated that they spent at least part of their time teaching subjects or grades they were not certified to teach. A higher percentage of teachers with emergency certificates was found in small school districts than in large districts (table 1). In addition, a higher proportion of elementary school teachers (25 percent) than of secondary school teachers (13 percent) had emergency certificates. This was true in each enrollment category, although the differential was most pronounced in the smaller districts.

Regionally, the highest proportion of teachers with emergency certificates was found in the Upper South and the Far West (table 2). However, certification requirements vary from State to State, and the qualifications for which a standard certificate may be granted in one State may earn only an emergency certificate in another. Thus, the Far West had a high proportion of teachers with emergency certificates largely because of its higher standards.

Amount of Education. In making regional comparisons, the amount of education completed is a more meaningful indicator of teachers' qualifications than is certification. Nationally, 14 percent of the beginning teachers had not received a bachelor's degree, usually considered to be a minimum requirement for teaching. The percentage of

TABLE 1. Beginning teachers with emergency certificates and those with less than a bachelor's degree, by teaching level and size of school district, 1956-57

Enrollment of school district	Number of teachers			Percentage with emergency certificate			Percentage with less than a bachelor's degree		
	Total	Elementary	Secondary	Total	Elementary	Secondary	Total	Elementary	Secondary
All school districts	4,065	2,296	1,769	20	25	13	14	22	4
25,000 or more	696	451	245	14	15	12	4	5	2
6,000 to 24,999	870	536	334	21	23	11	10	12	6
1,500 to 5,999	1,057	569	488	18	24	12	8	13	3
300 to 1,499	1,015	455	560	22	35	11	16	32	3
1 to 299	427	285	142	30	36	17	50	71	8

TABLE 2. Beginning teachers with emergency certificates and those with less than a bachelor's degree, by region, 1956-57

Region	Total number of teachers	Percentage with emergency certificate	Percentage with less than a bachelor's degree
All regions	4,065	20	14
New England	228	17	4
Middle Atlantic	831	19	4
Upper South	218	28	21
Lower South	387	23	13
Great Lakes	776	20	17
Plains States	604	15	34
Rocky Mountain	156	21	22
Southwest	336	15	5
Far West	529	27	8

teachers with less than a bachelor's degree is generally lower than the percentage of those with emergency certificates (see tables 1 and 2) because some teachers have a bachelor's degree but lack the courses in education, practice teaching, and other qualifications for certification.

The proportion of teachers without a bachelor's degree is related to the size of school district, being highest in the districts with less than 1,500 enrollment. It is also much higher at the elementary level (22 percent), where the teaching shortage is more acute, than at the secondary level (4 percent). This difference is found in each enrollment category. Regionally, there are great differences in the percentage of beginning teachers who do not have a bachelor's degree, ranging from a low of 4 percent in New England and the Middle Atlantic States to a high of 34 percent in the Plains States. The high percentage for the Plains States is probably related to the fact that 1-room schools are still numerous in this region.

Salaries

In 1956-57 the average (median) salary of teachers beginning their pro-

TABLE 3. Salaries of beginning workers in selected occupations, 1956

Occupation	Average starting salary, 1956
Industrial position[1]	$4,596
Engineering	4,980
Accounting	4,464
Sales	4,440
General business trainee	4,356
Special therapist[2] Basic certificate	4,200
Federal career Beginning trainee position[3]	[4]3,670

[1]Frank S. Endicott, Trends in the Employment of College and University Graduates in Business and Industry, 11th Annual Report Northwestern University, 1957).

[2]Sidney G. Tickton, Trained Rehabilitation Workers: How Much Are They Paid (New York, The Seventh Company, Inc., May 1957).

[3]Federal Careers: A Directory for College Students, U. S. Civil Service Commission (Government Printing Office, Washington, D. C., 1956).

[4]This figure is not an average but the salary paid to all individuals entering this position.

fessional careers was $3,600. However, the earnings of individual teachers vary widely from the median with 19 percent earning less than $3,000, and 22 percent earning $4,000 or more.

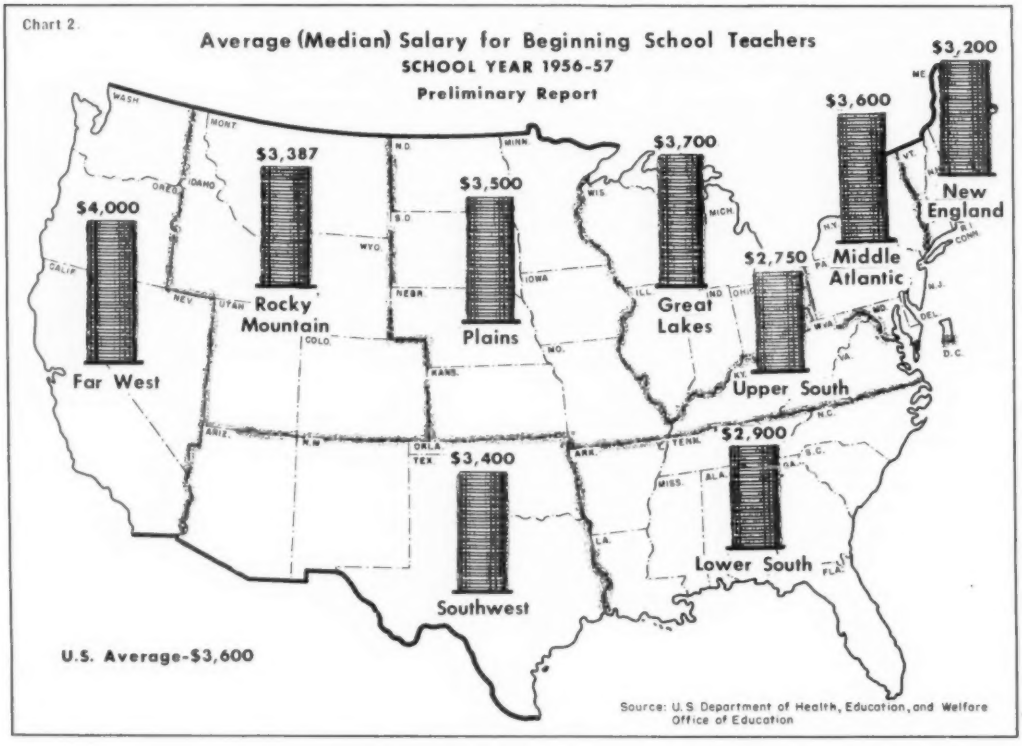
Median salaries in nine different regions of the country are indicated on chart 2. The highest median salary was found in the Far West, while the lowest was in the Upper South.

Variations in median salaries by enrollment of school district were not large except for districts with an enrollment of fewer than 50, where the average salary was $2,475. Differences in median salary by sex and by teaching level were also small. On the average, elementary teachers received $3,500, secondary teachers $3,600. Men averaged $3,700 and women $3,500. This small difference may reflect differences in assignment rather than differences in pay for the same work.

These starting salaries do not compare very favorably with salaries paid to beginners in industrial and business occupations. Average starting salaries for the industrial and business positions, as shown in table 3, are on the average 28 percent higher than those for the beginning teacher. This is a somewhat biased comparison inasmuch as the figures from the Endicott survey are not the average starting salaries paid by all private companies but by 200 of the biggest business and industrial concerns. The differential is a striking one, however, indicating the alternatives open to some college graduates.

The salaries of speech therapists were 17 percent higher than those for

Chart 2.



teachers, on the average. However, speech therapists must have, in addition to a bachelor's degree from a recognized college or university, one year of either intern-type on-the-job instruction in a rehabilitation setting or graduate work. Thus, their salaries are roughly comparable to those of beginning teachers.

The beginning Federal career trainee position requires the bachelor's degree (or its equivalent), plus passing an examination which is designed to secure the top talent. This salary is not an average entrance figure, but the actual entrance figure for this type of beginning job. Comparing the distribution of beginning teachers' salaries with the $3,670 paid to Federal trainees, we find that 6 out of 10 beginning teachers receive less than Federal trainees and 4 out of 10 receive more. However, the majority of these Federal trainees may receive a promotion to a position paying $4,525 within a year or two after being hired.

Commitment to a Teaching Career

Likelihood of Leaving Teaching. Probably the most startling finding of this survey is that half of last year's beginning teachers stated that they expected to leave teaching within 5 years. That men and women have radically different orientations to a teaching career is indicated by the difference in their answers to the question: "What is the likelihood of your leaving classroom teaching within the next 5 years." The figures show that 25 percent of the men and 65 percent of the women said they either "definitely" or "probably" would leave teaching within 5 years. The differential between men and women is equally large for elementary and secondary teachers.

Overall, the percentage of secondary teachers expecting to leave teaching within 5 years is lower than that for elementary teachers, primarily because women are found far more frequently at the elementary level than men. When we compare elementary and secondary teachers for the two sexes separately, we find that for both men and women the percentage of secondary teachers who expect to leave in 5 years is higher than for elementary teachers (table 4). One possible explanation of this finding is that secondary teachers have more skills and knowledge that are transferable to other occupations than do elementary teachers, and, having a wider range of alternatives from which to choose, they are more likely to leave.

Career Plans. Further light on the differing career orientations of men and women is provided by answers to a question on career plans (table 5).

TABLE 4. Proportion of beginning teachers in 1956-57 who expect to leave teaching within five years

Sex	Percentage leaving			Number of teachers		
	Total	Elementary	Secondary	Total	Elementary	Secondary
Both sexes	50	54	45	4,065	1,769	2,296
Men	25	20	27	1,523	1,035	488
Women	65	63	70	2,542	734	1,808

Only 28 percent of the men and 14 percent of the women expect to stay in teaching continuously until retirement. The most frequent ambition of the men is to stay in education but in an administrative, supervisory, or other nonteaching position. It is doubtful that all of the 49 percent of the men who have this ambition will achieve it. Those who do achieve it will be lost to teaching, though not to education. Those who do not achieve it may remain as teachers, but many may leave when they see that their upward mobility within education is blocked. By contrast, relatively few women (8 percent) hope to move to nonteaching posts in the educational field.

As might be expected, the survey disclosed that the majority of women (68 percent) hope to become homemakers. A growing tendency for women to work after marriage may be reflected in the fact that 80 percent of the women who leave teaching for homemaking state they hope to return to teaching at some future time. Finally, 17 percent of the men expect to leave education for another occupation, contrasted with 5 percent of the women. In general, the proportion of teachers with a really strong commitment to teaching appears to be small, but a large group can be expected to devote at least part of their working lives to teaching, contingent upon other factors. Men seem to see teaching primarily as a stepping stone to some other type of occupation, either in or out of education, while for most women teaching is likely to take second place to family responsibilities.

Plans for 1957-58. The general question of commitment to teaching was narrowed down still further with a question on plans for the school year 1957-58 (table 6). For the immediate future, the difference in the plans of men and women were not marked, except for the fact that only men expected to go into military service and only women expected to go into homemaking. Approximately the same percentage of men and women expected to be teaching either in the same district or in another district. That 17 percent of the 1956-57 teachers did not expect to be teaching in the fall of 1957 indicates

TABLE 5. Career plans of beginning teachers in 1956-57, by sex

Career plan	Percentage distribution		
	Total	Men	Women
Total[1]	100	100	100
Continue teaching until retirement	19	28	14
Continue in the field of education until retirement, but hope to move from classroom teaching into some other area of education eventually	23	49	8
Leave teaching in order to devote time to homemaking; WOULD NOT want to return to teaching later	8	--	13
Leave teaching in order to devote time to homemaking; WOULD want to return to teaching later	35	--	55
Leave education for another occupation	9	17	5
Other, or no answer	6	6	5

[1] Total number of respondents was 4,065--1,523 men, 2,542 women. [2] Less than 0.5 percent.

a potentially high rate of turnover for the first year of work.[3] However, some of the 1956-57 beginning teachers who were not teaching in the fall of 1957 may be expected to return later--for example, the men in military service and some of the homemakers.

[3] The Office of Education is now conducting a followup survey in an attempt to determine which teachers actually left teaching and whether they are the same teachers who, in the spring of 1957, had planned to leave.

TABLE 6. Beginning teachers' plans for next school year (1957-58), by sex

Plans for next school year (1957-58)	Percentage distribution		
	Total	Men	Women
Total[1]	100	100	100
Teach in this school district	66	67	66
Teach in another school district	17	14	18
Work in education but NOT as a classroom teacher	(2)	(2)	(2)
Devote time to full-time homemaking	5	--	7
Be in military service	3	9	--
Go back to school for further training in education	2	2	2
Go back to school for further training in a field outside of education	1	2	1
Be gainfully employed outside of education	3	4	2
Other and no answer	3	2	3

[1] Total number of respondents was 4,065--1,523 men, 2,542 women. [2] Less than 0.5 percent.

WOMEN IN LEGAL WORK *

by Verna E. Griffin
Women's Bureau

Back in 280 B. C., a Roman named Coruncanius became the first known practicing attorney. During the ages that followed, law came to be regarded as solely a man's profession. It was not until 1869 A. D. that the first woman attorney on record in the United States was licensed to practice law in Iowa.

In less than 90 years, however, women lawyers have achieved much to offset their lateness in entering the profession. By 1920, they were admitted to the bar by all States on an equal basis with men. Today, practically all law schools enroll women students, and all courts admit qualified persons--regardless of sex--to practice before them.

By 1950, more than 6,000 women were included among the more than 180,000 lawyers and judges employed in the United States. While the number of women in the profession remains small, their relative gains have been substantial. In 1910, they represented less than 1 percent of all experienced lawyers and judges, but by 1950, they accounted for about 3.5 percent. Their growth has been especially rapid in recent years; some 75 percent of the 2,800 net increase recorded for all employed lawyers and judges between 1940 and 1950 was accounted for by women. This increase changed the ratio of women to men in the legal field from only 1 to every 41 in 1940 to 1 to every 28 in 1950.

Outlook for Women in the Legal Profession

While most attorneys today are in general law practice, there is an apparent trend for increasing numbers to specialize by limiting their practices to certain kinds of legal cases. On the whole, women's opportunities in the legal profession may grow with this trend. New and expanding areas of specialization create new jobs which women may enter along with men in order to meet the demand for qualified talent.

Women's opportunities would seem best in those law specialities where their contributions to the field have already been recognized. Some of these specialities are real estate and domestic relations work, women's and juvenile legal problems, probate work (in which about one-third of all women judges are employed), and patent law for those who have the required training in science. Entrance is usually easier in these legal specializations, where women do not have the additional burden of pioneering in a legal field traditionally occupied by men.

In the highly competitive climate currently evident in the legal profession, getting started in law practice is a major problem. For establishing independent practices, women law graduates might well investigate the opportunities in smaller cities and suburban areas where there may be a growing demand for legal services. While women professional workers are more numerous and, therefore, may be more widely recognized in large cities like New York and Washington, there are already many lawyers in these areas. Women who wish to have their own law offices should be financially prepared to cover most of their expenses

*This article supplements the general discussion of lawyers which appears on page 180 of the 1957 Occupational Outlook Handbook. If desired, this article may be clipped and inserted in the Handbook.

during the first years in independent practice when lawyers' incomes are usually low.

Excellent academic records from outstanding law schools are especially important to women law graduates who seek salaried employment. The Occupational Outlook Handbook reports that the chances for obtaining these jobs are most favorable for those students who graduate from well-known law schools in the top 10 percent of their classes. Since the number of law graduates has been exceeding the number of jobs available, many of the other men and women law graduates have entered jobs outside the legal profession.

On the basis of data from 6,256 women lawyers and judges, the 1950 Census reported that for every 100 of these women, 41 were self-employed; 31 were salaried in law offices and private industry; and 28 were working for Federal, State, and local governments. These women accounted for over 6.5 percent of all lawyers and judges employed by the government, almost 4.5 percent of those salaried by private law and business firms, but only 2.5 percent of the independent, nonsalaried lawyers.

Most of the women lawyers who are self-employed reportedly practice alone. However, law partnerships composed of husbands and wives or fathers and daughters are not unusual. Since law firms often assign women lawyers to research work, women who want direct client contacts and court-work often enter independent practice so they can do the kind of legal work that interests them most.

Women in Law Firms. Women lawyers are represented among the partners and associates in the 3,000 law firms that are rated as "preeminent" by The Bar Register: 1957. Women were partners in 32 of these listed law firms; they comprised 35 of the 262 partners in these firms. Likewise, 56 women were among 334 associates in another 50 law firms. Most of these women were in firms with less than 11 members.

Women law graduates who are employed as law clerks and associates by law firms often conduct legal research rather than perform duties that involve client contacts and court litigation. Legal research is also useful as part-time work for women lawyers with family responsibilities. Women lawyers, however, have experienced difficulties in finding employment in many law firms, most of which have reported that they do not interview women for employment in legal work.

In Legal Aid. In the larger cities, some lawyers are employed full time by legal-aid societies and offices which provide legal services free of charge or at very nominal fees to low-income groups. Most of the cases brought to these offices require legal advice or the preparation of legal documents, and only a small percentage of the cases handled involve any courtroom work. Because of the social service nature of these organizations, women are considered particularly well suited for legal-aid employment. For much the same reason, women often find this type of legal work particularly interesting despite the necessarily low salaries.

In Services to the Profession. Varying degrees of legal training are required for employment in the different services to the legal profession. For example, law professors most generally are law graduates and members of the bar; law editors may have to be law graduates for some publishers but not for others; and law librarians may be required to have either a law degree or a degree in library science.

Women law graduates have entered the field of teaching law, which accounted for about 1 percent of all full-time lawyers in 1954. In view of increasing teacher shortages, it can be anticipated that more women law graduates will become law instructors and professors in the future.

Employment opportunities for women in law libraries have been favorable and are expected to remain so. Women with legal training have been employed in some of the more desirable posts in major court and law school libraries. Probably the most outstanding example is the woman lawyer who has been librarian for the United States Supreme Court since 1947.

In Government. A 1954 survey by the U. S. Civil Service Commission showed that over 7,200 women were employed by the Federal Government in legal and kindred jobs. In job classifications that required training equivalent to graduation from an approved law school--a group which included adjudicators, attorney-advisers, and trial attorneys--there were 747 women, about 7 percent of all workers in such jobs. About 60 percent of this group of women were concentrated in three agencies: The Veterans Administration, the Department of Justice, and the General Accounting Office. Almost half of these 747 women were performing work that demanded a relatively high amount of professional responsibility, in positions with a current salary range between $6,390 and $12,690 (excluding longevity increases).

About 85 percent of the remaining 6,498 women employed by the Federal Government in 1954 in legal positions were classified as claims examiners and legal instruments examiners. Such jobs involve quasi-legal work for which a knowledge of particular laws, regulations, or precedents is required, but graduation from law school is not necessary. Again, over 60 percent of these women were employed by three agencies: The Department of Health, Education, and Welfare; the Treasury Department; and the Veterans Administration. Practically all women in this group were in positions with a current salary range between $3,415 and $6,250 (excluding longevity increases).

Law-trained women are working not only for the Federal Government, but also for State, county, and local agencies. Furthermore, at all levels of government, women lawyers serve in professional and administrative non-legal positions in which a knowledge of laws and legal procedure is useful.

In the Judiciary. According to the Directory of American Judges, about 185 women were judges for Federal, State, county, and city courts in 1955. Of these, over 80 percent were judges in various county courts. A few were serving in Federal courts, including the United States Court of Appeals for the Sixth Circuit, and a few more held State judicial posts. The remainder, about 10 percent, were judges in municipal courts in major cities like New York, Philadelphia, Cleveland, Toledo, Minneapolis, New Orleans, and Los Angeles. The directory excluded minor judicial posts like justices of the peace (which thereby excluded an estimated large number of women judges) and such specialized courts as the Tax Court of the United States.

Biographical sketches disclosed that only about a third of these women judges held law degrees or had been trained by reading law in law offices; only 57 of them were also members of the bar in their States. This may be due to the fact that many of the judgeships held by these women were elective offices for which legal training generally was not a requirement.

More than half of the women judges listed in the directory were concentrated in eight States: Georgia, Kansas, Connecticut, Michigan, California, Ohio, North Carolina, and Oklahoma. Seventeen States had no women judges in the courts covered by the directory in 1955.

In Private Industry. Lawyers are employed on the legal staffs of large manufacturers, insurance and real-estate firms, banks, public utilities, and other firms. Insurance is generally regarded as a particularly attractive field for women lawyers. An informal survey in the early 1950's by the

Women's Division of the Institute of Life Insurance found that an increasing number of women work in life-insurance legal departments. This survey reported that at least two women were the chief legal counsels for their companies.

Banking, another field in which women have advanced to responsible positions, also offers opportunities. An example of success in this field is that of the woman lawyer who entered the banking field in a Milwaukee trust company, advanced to trust officer within 4 years, and later became the company's first woman vice president. Before she was 40 years old, she held one of the top financial posts in the Nation--Assistant Treasurer of the United States.

Many other fields of private enterprise have had their successful women lawyers as well. There is the woman lawyer who within 10 years became secretary and general counsel for one of the top radio and television networks in the Nation, later moving up to vice president and special assistant to the president. In the petroleum industry, there is the woman lawyer who within 5 years advanced to assistant secretary and general counsel for her company.

These examples illustrate only a few of the successes achieved by women lawyers in private industry. They point up some of the areas of legal work which have been and can be entered by women who have sufficient interest and ability and who acquire the necessary professional training.

Geographical Distribution of Women Lawyers

The majority of women lawyers are in metropolitan areas of 200,000 or more population, and a large proportion are concentrated in a few States. Almost one-fifth are in New York State, followed by large numbers in California, the District of Columbia, Illinois, Ohio, and Texas. The largest proportion of women to total lawyers and judges are in the District of Columbia, Alaska, California, Oklahoma, and Massachusetts.

Between 1940 and 1950, the number and proportion of women lawyers increased in all regions of the country. The largest proportionate gains, however, were made in the South (which had over 80 percent more women lawyers and judges in 1950 than in 1940) and in the West (over 75 percent more). For every 10 women lawyers and judges, the 1950 Census reported that 4 were in the Northeast, 3 were in the South, 2 were in the North Central States, and 1 was in the West.

Income

An income survey by the U. S. Department of Commerce in 1955 indicated that lawyers' incomes reach a peak after about 20 to 25 years in practice. In comparison, incomes are considerably lower for lawyers in practice less than 10 years. A report for the Survey of the Legal Profession estimated that only about 25 percent of women lawyers remain in practice more than 10 years. From these reports, most women lawyers are in practice when the earning power of lawyers is relatively low, and the majority of them leave the profession before periods of peak earning power are reached.

According to the Commerce survey, the median income for all lawyers in 1954 was $7,833. The median income for lawyers in practice for 20 to 25 years was $9,863; for those with only 5 to 10 years of practice, it was $7,000; and for those with less than 5 years, $4,856.

The latest record of income for women lawyers and judges is the 1950 Census. Their median income at that time was $3,616, but the median for all experienced lawyers and judges was $6,130. Among the women, almost 15 percent reported incomes over $7,020, and almost 56 percent, under $4,000.

EMPLOYMENT OUTLOOK FOR INSTRUMENT REPAIRMEN

by Leo E. Gershenson

Young men with mechanical ability who like to do work requiring thought as well as manual skill would do well to consider for a vocation the small but growing occupation of instrument repairmen. Workers in this occupation keep in good operating condition the many thousands of instruments used in industry and in the home to control or measure temperature, pressure, speed, altitude, or other physical quantities, characteristics, or conditions.

American industry is becoming increasingly dependent upon instruments in many of its production and research activities. The recent trend toward automation of more manufacturing processes has greatly increased the need for instruments and control devices. Future growth in the use of instruments is expected to be even more rapid, as automation is extended into new areas and scientific research activities are expanded. As a result, employment of instrument repairmen will probably grow considerably in the years ahead, offering excellent opportunities to qualified young men.

Nature of Work

These skilled workers repair, maintain, and install instruments. Because instruments range in complexity from simple thermostats which control the temperature in homes to complicated instrumentation systems which direct hundreds of manufacturing operations, the skills required of instrument repairmen (also called instrument servicemen or instrument technicians) have a wide range.[1]

Instruments are usually classified according to the principles by which they operate, such as mechanical, hydraulic, pneumatic, electrical, electronic, or optical; or according to intended field of use, such as industrial,

An instrument repairman adjusts a resistance thermometer in an oil refinery.

scientific, or mechanical. Some of the more common types of instruments are recording thermometers which measure variations in temperature, gyroscopic devices which aid in stabilizing aircraft and ships, and voltmeters and ammeters which measure characteristics of electricity.

When repairing defective instruments, the instrument repairman may first check their accuracy with any one

[1] These craftsmen should not be confused with instrument makers who build industrial and scientific instruments by making parts and assembling them into finished products. Although the instrument repairmen discussed in this occupational statement are often called upon to handle electronic equipment, their main activity is not concerned with the maintenance of electronic instruments. Electronic technicians are the specialists who customarily work with electronic instruments. The 1957 edition of the Occupational Outlook Handbook contains occupational briefs on instrument makers (page 373) and electronic technicians (page 317).

of many different types of test equipment. For example, he may use a potentiometer (an instrument for measuring or comparing voltages) which is designed to help him diagnose trouble. He may disassemble the instrument in order to replace worn or broken parts or to rewire, straighten, or resolder inoperative or damaged parts. The instrument repairman may use schematic diagrams, assembly drawings or blueprints, as guides in repairing instruments. He may also make electrical tests to locate trouble in component parts or in electrical circuits. After the repair has been made, he reassembles the instrument and rechecks its operation with test equipment. He also checks the accuracy of dial indicators on the instrument.

In doing preventive maintenance work, the instrument repairman tries to detect defective instruments and repair them before they break down and cause production losses and inconvenience. The repairman doing maintenance work may visually inspect instruments for loose or broken parts, rust, jammed threads, or other defects. He may also regularly clean and lubricate the instrument and adjust it to keep it operating properly. The repairman also checks instruments on testing equipment to be sure they are in good operating order. Part of his maintenance job may include keeping records to show the condition of the instruments being examined and a timetable showing when servicing is to be performed.

When doing installation jobs, instrument servicemen employed by instrument manufacturers may advise customers as to the most advantageous placement of instruments. They may also test instruments during initial operation and explain to the customer's own maintenance staff the operation of the instruments and the care they require.

Some instrument technicians are employed by instrument manufacturers to work with engineers in developmental and research work. These highly trained technicians may assist the research engineers by planning, laying out or modifying instruments and test equipment for test purposes. They may convert or modify existing equipment according to new specifications or changes in design.

In addition to using many types of testing equipment such as pressure and vacuum test gages, and tachometer testers (speed counters) in order to detect causes of trouble, instrument repairmen also use simple handtools, such as screwdrivers, wrenches, hammers, pliers, tweezers, soldering irons, files, and punches in their repair work.

Where Employed

The two principal fields of employment of the approximately 50,000 instrument repairmen at work in 1957 were firms manufacturing engineering, laboratory, scientific, and optical instruments; mechanical measuring and controlling instruments; and gas and electric utilities. Substantial numbers were also employed by petroleum refineries; chemical, rubber, aircraft, missile, automobile, and electrical equipment manufacturers; and airlines. Instrument repairmen also work in such diverse places as steel mills, papermaking and food-processing plants, and liquor distilleries. In mid-1957, about 5,000 of these skilled repairmen were working for Air Force, Navy, and Army installations, and for civilian government agencies.

Although instrument repairmen are employed in almost every large city, their jobs are concentrated in the main centers of instrument making such as Boston, Chicago, Los Angeles, Minneapolis, New York City, Philadelphia, Rochester, St. Paul, and Washington.

Training, Other Qualifications, and Advancement

Most instrument repairmen learn their trades while working on the job.

They are generally hired as trainees by instrument manufacturers or by other employers who use a considerable number of instruments in their manufacturing or processing operations. Some companies have formal programs for training their instrument repairmen; in others, new workers learn the trade by working with experienced repairmen. Some of the companies with formal training programs offer their trainees specialized courses in instrumentation theory, mathematics, and blueprint reading in addition to practical training. These courses may be given during or after working hours by local schools.

A small number of instrument repairmen enter the occupation through apprenticeship programs. The apprenticeship program, which generally lasts about 4 years, includes some shopwork in the use of handtools and practical experience in the repair and maintenance of many types of instruments. The program also includes the study of related technical subjects such as mathematics, physics, electronics, chemistry, blueprint reading, and instrumentation theory.

Other men have trained for this field by attending technical institutes and junior colleges. These post-high-school educational institutions offer courses which generally last about 2 years. The courses include both manual training and classroom instruction in the basic principles of science. Because of the broad programs offered by these schools, their graduates are often able to obtain technician jobs as instrument servicemen or engineering assistants doing research and developmental work in instrument company laboratories.

Several instrument manufacturers offer specialized training to the skilled maintenance employees of the companies purchasing their products. These training courses last from 1 week to 9 months, depending upon the complexity of the instruments to be serviced. The men are instructed in design, theory, maintenance, and operation of instruments so that they can service the equipment after it has been installed in their employers' plants.

The Armed Forces technical schools also offer training in instrument servicing. Young men who expect to enter the Armed Forces, and who are interested in this field of work, would do well to investigate the opportunities for training and work experience in the instrument field available to persons in military service. The skills acquired in this trade in the Armed Forces are often transferable to civilian work.

The time required for acquiring the skills and technical knowledge of this occupation varies considerably depending upon such factors as the complexity of the instruments being serviced and the intensity of the training. Many companies have programs which last from 2 to 3 or more years. Some training authorities estimate that 4 to 5 years of training and experience are necessary in order to become a topflight instrument repairman. Some employers reduce on-the-job or apprenticeship training time if their employees attend the intensive courses given by instrument manufacturers.

Trainees as well as apprentice applicants generally must have a high school education or its equivalent. Courses in mathematics, physics, chemistry, electricity, electronics, machine shop practice, and blueprint reading are considered useful preparation for these jobs. Some employers give applicants tests to determine their mechanical aptitude and manual dexterity. If the applicants are to be employed in service branches where they will meet the public, they are expected to be neat in appearance and have the ability to get along with people.

Well-trained and qualified instrument repairmen may advance to positions of increasing responsibility as they acquire additional skill, knowledge, and experience. They can become group

leaders or foremen in maintenance departments. They may also advance to jobs as service representatives in branch offices of instrument manufacturing companies. Some instrument repairmen may eventually become engineering assistants in the engineering departments of instrument companies. With the increasing use of electronic components in instruments and control equipment, young men who hope to advance in the field of instrument servicing are advised to acquire a basic knowledge of electronics theory and principles.

Employment Outlook

The number of instrument repairman jobs is expected to increase at a faster rate than the labor force as a whole during the late 1950's and the 1960's. The increasing dependence on instruments and control equipment by industry, commercial establishments, and homes in the 1958-68 decade should accelerate the demand for skilled workers who can install, repair, and maintain these devices.

The use of instruments has expanded rapidly in the postwar period. Between 1947 and 1954, the value of shipments of the scientific, mechanical measuring, and optical instrument industries increased by 92 percent. The petroleum, rubber, paper, aircraft, and food-processing industries have been especially important in creating this increased demand for instruments.

In the future, continued growth in the use of instruments is expected. The industries already important as users of instruments will require increasing quantities of control and measuring devices as they develop more automatic processes. In addition, the increasing emphasis upon automatic production and continuous material flow in the automobile and other metalworking industries will require more instruments and complex controls. The anticipated increase in research activities in biology and medicine, chemistry, physics, meteorology, astronomy, and other fields will contribute to the growing demand for scientific instruments. The more widespread application of atomic energy will require complex measuring and control systems, and a possible rapid acceleration in satellite and missile work would also expand the demand for instruments.

The increasing complexity of instruments as well as the growth in the number of instruments in use will affect the employment and skill level of instrument repairmen. Employment will increase considerably, and workers with the best training in the fundamentals of mathematics, science, and instrumentation will be most in demand in this small occupation.

The vital function of instruments in manufacturing and processing operations makes their maintenance important in automatic and highly integrated production systems. More emphasis is being placed upon preventive maintenance today. A continuation of this trend will require the employment of increasing numbers of instrument repairmen.

Earnings and Working Conditions

In general, the earnings of instrument repairmen compare favorably with other skilled maintenance workers. Information collected from a small number of petroleum refineries showed that their instrument mechanics were earning from about $2.80 to $3 an hour in late 1957. In the steel industry, these skilled craftsmen were receiving an hourly rate ranging from $2.54 to $2.80 an hour during the same period. Some highly skilled instrument repairmen employed as service representatives by instrument manufacturers were earning from about $3.10 to $4 an hour in 1957.

Instrument repairmen employed by the Federal Government are paid the prevailing rate for the occupation in a particular location. Thus, in mid-1957, the hourly wage rates for

these workers employed by the Government in the Washington, D. C., area ranged from $2.14 to $2.60, which were the same rates as for those employed in private industry in the area.

The work environment of the instrument repairman depends largely on his particular assignment. In a single day, for example, a repairman may spend part of the day servicing instruments on the factory floor amidst the noise, oil, and grease of machinery; and part of the time working at a bench in a quiet, clean, well-lighted repair shop. Instrument repairmen employed by instrument manufacturers as servicemen may do considerable traveling within the area serviced by their employers.

Most instrument repairmen work a 40-hour, 5-day week. However, those employed in petroleum refineries and chemical plants which operate 24 hours a day and 7 days a week may work on any one of the three shifts--often on a rotating basis. They may also be part of an emergency crew which may be called on for Sunday and holiday work. Premium pay is generally paid for night and holiday work. Most of the companies which employ instrument repairmen provide paid holidays and paid vacations. Many of these specialists may also receive benefits, such as life insurance, hospitalization, medical and surgical insurance, sickness and accident insurance, and a retirement pension.

Instrument repairmen may be members of one of several unions depending upon the industry in which they are employed. Some of the more important unions to which these craftsmen belong are the International Brotherhood of Electrical Workers; the International Union, United Automobile, Aircraft & Agricultural Implement Workers of America; the International Association of Machinists; and the International Brotherhood of Pulp, Sulphite and Paper Mill Workers.

CERTIFICATION REQUIREMENTS FOR GUIDANCE WORKERS

The number of States having certification for school guidance workers has increased 40 percent in 2 years, according to a recent report released by the Office of Education of the U.S. Department of Health, Education, and Welfare. Twenty-seven States had certification in 1955, 32 in 1956, and 41 in 1957. Certification is now mandatory in 34 States and optional in 7. The publication outlines the specific requirements for counselor certificates. Most States require a State teaching license and a master's degree, or equivalent, in guidance training. About half of the States prescribe at least 1 year of experience in an occupation other than teaching.

Copies of this publication, Guidance Workers Certification Requirements, may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 25 cents.

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*This index covers only issues published since the publication of the 1957 edition of the Occupational Outlook Handbook, which this periodical is designed to supplement. It thus excludes the first two issues of Volume 1.

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